Gynaecological causes of acute abdominal pain: an update

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Abstract

Acute abdominal pain is common and accounts for 5%–10% of all emergency department admissions. The extensive nature of the differentials can make the definitive diagnosis challenging, particularly in women of childbearing age. There is often a conundrum as to whether the emergency is of gynaecological or surgical origin: delay in diagnosis can result in significant morbidity and mortality. This article explores the history, examination and investigation of women presenting with acute abdominal pain. It considers common gynaecological causes, including those found in pregnancy.

Keywords Abdominal pain; ectopic pregnancy; endometriosis; gynaecology; ovarian torsion; pelvic inflammatory disease

Introduction

Abdominal pain presents a diagnostic challenge for surgeons and gynaecologists alike. In women of childbearing age, the causes of abdominal pain vary from the self-limiting to the life-threatening. The diagnosis is often based on history and examination and the patient is usually triaged to gynaecological or surgical specialties. Thereafter, investigations such as blood tests and imaging are often required, and sometimes prompt surgical intervention is deemed necessary. A vigilant, combined approach between gynaecology and surgery may be required to ensure a swift and optimal clinical outcome for the patient.

History

A careful, detailed history regarding the nature of the pain can indicate the source and likely cause. Ascertaining the possibility of pregnancy is paramount to the diagnosis: it is crucial to determine this swiftly to avoid delay in management of life-threatening conditions such as ectopic pregnancy. Date of last menstrual period enables calculation of gestation if pregnancy is suspected or confirmed. It also enables calculation of timing of ovulation and next menstrual period if pregnancy is excluded. History should then explore any bleeding which may have occurred during the pregnancy and quantify how heavy this has been. Important risk factors can then be explored such as history of previous ectopic pregnancy, pelvic inflammatory disease, previous tubal surgery, fertility treatment, conceiving with IUS or IUD *in situ*, smoking and increasing maternal age.

Abdominal pain that is gynaecological in origin tends to be located in the lower abdomen and pelvis. A severe pain associated with vomiting should be pathopneumonic of ovarian torsion until proven otherwise and requires prompt investigation as management to preserve the ovary is time-critical. Pain secondary to ovarian cyst rupture is often sudden, sharp and unilateral and may radiate to the lower back.

With regard to acute presentations of longstanding chronic pain, the timing can also assist diagnosis. Pain secondary to endometriosis presents typically with the onset of pain 1 week prior to menstruation and cyclical dysmenorrhoea. There can be associated bloating, dyspareunia and dyschezia, particularly at the time of menstruation.

Symptoms of vaginal discharge should be explored, and a sexual history taken. Pelvic inflammatory disease may be causing the pain and is often associated with vaginal discharge.

Past gynaecological history including smear test history and family history can help to exclude more uncommon causes of pain such as fibroid degeneration and ovarian tumours. Pressure symptoms may be reported such as urinary frequency, abdominal bloating and early satiety.

Examination

A systematic approach to examination will aid diagnosis of the cause of pain. A full set of observations are crucial to detecting haemodynamic instability which could result, for example, from haemorrhage secondary to a ruptured ectopic pregnancy, or sepsis secondary to pelvic inflammatory disease (PID).

The abdomen should be examined to determine the location of pain and the presence of masses or ascites. Pain secondary to ovarian or tubal pathology is often unilateral and localized to the right or left iliac fossa. Rebound tenderness and guarding may be found in cases of peritonism and haemoperitoneum. The uterus is not usually palpable abdominally unless a mass is present (such as a fibroid) or in pregnancy from around 12 weeks' gestation.

A bimanual and speculum examination may aid diagnosis. Speculum examination enables visualization of the lower genital tract. Presence of abnormal discharge may indicate PID. The cervix should be visualized. If bleeding is occurring in pregnancy, an open cervix can suggest miscarriage, which may be the cause of pain.

Bimanual examination enables palpation of the uterus: more specifically its size, whether it is anteverted or retroverted and its mobility. An enlarged uterus may be due to pregnancy or masses such as fibroids. A retroverted uterus is a variation in pelvic anatomy which affects 25% of women. However, a retroverted, immobile uterus can also occur as a result of adhesions or masses. For example, endometriosis and PID can cause retroversion secondary to adhesions. Similarly, fibroids can cause the uterus to retrovert.

Bimanual examination also enables assessment of the cervix: cervical excitation on examination can indicate PID. The adnexa can also be assessed: palpable masses could be secondary to ovarian cysts, an ectopic pregnancy or tubal abscess.

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Investigations

In women of reproductive age, it is imperative to test for pregnancy, even for patients in whom this is a remote possibility. The urine can also be tested to exclude non-gynaecological causes of pain such as urinary tract infection. Bloods should be taken to assess for anaemia (in event of acute causes such as ruptured ectopic or chronic causes such as heavy menstrual bleeding). Signs of infection (for example in PID) may cause a rise in WCC and CRP. A group and save should be taken in case of need to go to theatre and in cases of pregnancy, to ascertain rhesus status and the potential need for anti-D administration. Lactate can be useful, particularly where it may be raised (for example in ovarian torsion).

Ultrasound is usually the primary imaging modality to visualize the pelvis and reproductive tract. Transvaginal scan can assist in obtaining clear images, particularly where abdominal views may be restricted by body habitus. Where ovarian torsion is a possibility, urgent imaging is mandatory.

CT can enable rapid assessment of the pelvic organs; however, its drawbacks include the ionizing radiation, particularly the risk this poses in pregnancy and its link to contrast nephropathy. MRI, although sometimes limited in availability and prone to artefact, is safe in pregnancy and can be helpful in assessing pelvic organs and soft tissue. This scan does take longer to perform.

Diagnostic laparoscopy is considered if the cause of pain is not clear after investigation. It is also the mainstay of treatment for acute conditions which can cause rapid deterioration, morbidity and mortality: namely ectopic pregnancy and ovarian torsion.

Differential diagnosis

In the pregnant patient, ectopic pregnancy must be considered until proven otherwise, as rupture and haemorrhage can be life-threatening. In the non-pregnant patient, ovarian torsion can cause significant morbidity if not treated promptly to preserve the ovary. These two causes, in particular, depend on careful assessment and early treatment without delay. Other complications from ovarian cysts and acute pelvic inflammatory disease are the most common gynaecological causes of abdominal pain in the non-pregnant female patient (Table 1).

Ectopic pregnancy

Ectopic pregnancy occurs in 11/1000 pregnancies in the UK. It is a pregnancy which implants outside the endometrial cavity. Previous tubal injury is a risk factor (for example from infection or surgery or previous ectopic), as is smoking, use of an intrauterine device and *in vitro* fertilization.

The UK and Ireland confidential enquiries into maternal deaths confirm that between 2015 and 2017, 5 of the 99 women who died before 24 weeks' gestation had an ectopic pregnancy. The life-threatening nature of this condition means that any pregnant woman presenting with abdominal pain must be considered to have an ectopic until proven otherwise. Presentation is usually 6–8 weeks after the last menstrual period.

Transvaginal ultrasound is the imaging of choice for diagnosis of ectopic pregnancy. A serum beta-human chorionic gonadotrophin (B-HCG) level enables planning of management (the initial level indicates the success and potential of expectant or medical management). In an intrauterine pregnancy, the level of B-HCG will double every 48 hours: often this does not occur in ectopic pregnancy.

Women typically present with unilateral pelvic pain and may report vaginal bleeding. Ruptured ectopic can cause shoulder tip pain and signs of haemodynamic instability. Rapid large bore intravenous access, fluid resuscitation and urine HCG status should be obtained without delay in such situations. Blood should be sent and a full blood count and group and save obtained. This is important to cross-match blood if required but also to establish rhesus status, should the patient require anti-D. Surgical treatment is by laparoscopy or laparotomy: a tube-sparing procedure (salpingostomy) can preserve fertility; however, 8% of patients have persistent ectopic after salpingostomy and therefore salpingectomy may be preferred (complete removal of the tube). In clinically stable patients, conservative treatment with expectant monitoring or medical treatment with methotrexate can be offered provided the patient meets certain criteria.

Gynaecological causes of acute abdominal pain

Specific to pregnancy	Occurring in both non-pregnant and pregnant patients
Ectopic pregnancy	Ovarian torsion
Miscarriage	Pelvic inflammatory disease
	Ovarian masses
	Uterine fibroids
	Endometriosis

Table 1

Miscarriage

Miscarriage is the loss of an intrauterine pregnancy before 24 weeks of gestation. It can be classified as early (pregnancy loss before 12 weeks of gestation) or late (between 12 and 24 weeks of gestation). One in four pregnancies end in miscarriage and this accounts for 50,000 inpatient admissions to hospital in the UK annually.

Symptoms include vaginal bleeding, cramping lower abdominal pain and a loss of pregnancy symptoms. Cervical shock can occur; this causes vasovagal syncope as a result of dilation of the cervical canal by passage of blood clots or products of conception.

Investigations should include a thorough history and examination, including a speculum examination to visualize the cervical os. A full blood count, βHCG and group and save should be obtained. Trans-vaginal ultrasound enables diagnosis of miscarriage if the following are visualized: a mean gestational sac diameter $\geq$ 25 mm (with no obvious yolk sac), or a fetal pole with a crown-rump length $\geq$ 7 mm and no evidence of fetal heart activity.

First line management is often expectant: bleeding and pain should settle within 7–14 days. Medical management involves administration of misoprostol (and sometimes mifepristone prior to this). If women experience heavy bleeding or if they feel light-

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headed or are struggling to cope with the pain, then hospital attendance is required. Surgical management can be offered and is by either manual vacuum aspiration (MVA) under local anaesthetic, or by evacuation of retained products of conception under general anaesthetic. It is important that women are provided with contact details of the early pregnancy assessment unit to ensure that they are supported safely throughout their chosen method of management.

The psychological sequela from an ectopic pregnancy or miscarriage is significant: 1 in 6 women will experience post-traumatic stress disorder (PTSD). Support should be provided for women to reduce the psychological morbidity associated with the condition.

Ovarian torsion

Between 2.7% and 7.4% of all gynaecological emergencies are due to ovarian torsion. It most commonly occurs in women of reproductive age and can also occur in pregnancy. Diagnosis is normally dependent on a thorough clinical history, examination and ultrasound scan. It is important that a high index of suspicion is applied early on in the patient's presentation, as delay can result in loss of the ovary, and thereby fertility implications due to decline in reproductive capacity. Diagnosis can be challenging and a normal ultrasound scan does not exclude ovarian torsion. Therefore, in the presence of severe symptoms, the decision to operate should be made on clinical grounds.

The symptoms of ovarian torsion are often acute onset pelvic pain coupled with nausea and vomiting (occurring in 85% of cases). Pyrexia and tachycardia can also occur (Figure 1). With regard to risk factors, some data suggests that ovarian cysts >5 cm are more likely to undergo torsion. Patients who have undergone assisted reproductive technology (ART) are at risk of ovarian hyperstimulation syndrome and in turn an 11-fold higher risk of ovarian torsion. Serum markers such as lactate dehydrogenase and CRP can be raised (white cell count in approximately 50% of patients with torsion). This is because of ischaemic injury (either intermittent or complete) to the ovary. Ultrasound is the imaging of choice, although MRI can be useful particularly if torsion is suspected in second or third trimesters of pregnancy.

Treatment is surgical: often laparoscopic oophorectomy is performed. However, this will potentially adversely impact fertility. Therefore, de-torsion and oophoropexy can be considered as a conservative approach in women wishing to preserve fertility.

Pelvic inflammatory disease

Pelvic inflammatory disease (PID) should be considered a possible diagnosis in sexually active women presenting with pelvic pain. Prompt identification and treatment of PID is important to reduce impact on future fertility: indeed, Pavletic *et al.* found post-infection infertility in 40% of women with PID. The risk of ectopic pregnancy and chronic pelvic pain are also increased following PID. PID is often the result of ascending infection from the endocervix: *Neisseria gonorrhoea* and *Chlamydia trachomatis* are responsible for 25% of cases. *Mycoplasma genitalium* should also be tested for.

Symptoms include bilateral lower abdominal pain, vaginal discharge (often purulent), deep dyspareunia, abnormal vaginal bleeding (post-coital/inter-menstrual/menorrhagia) and dysmenorrhoea. On examination, bilateral abdominal tenderness and fever may be found. Speculum and vaginal examination are important as adnexal tenderness and cervical tenderness can lead to the diagnosis. A positive test for chlamydia or gonorrhoea supports the diagnosis but cannot exclude PID if absent. Elevated CRP or ESR also support the diagnosis. Diagnosis is usually clinical (65%–90%) and empirical antibiotic treatment should be offered to any non-pregnant women under 25 with acute bilateral lower abdominal pain and associated tenderness on bimanual examination. Inpatient IV antibiotic therapy is recommended for clinically severe cases (pyrexia >38, or signs of pelvic peritonitis or tubo-ovarian abscess).

Fitz-Hugh-Curtis syndrome is a known complication, which can cause right upper quadrant pain and is diagnosed at laparoscopy by characteristic perihepatic adhesions causing perihepatitis. A tubo-ovarian abscess may result from PID: an inflammatory mass arising from the fallopian tube and ovary

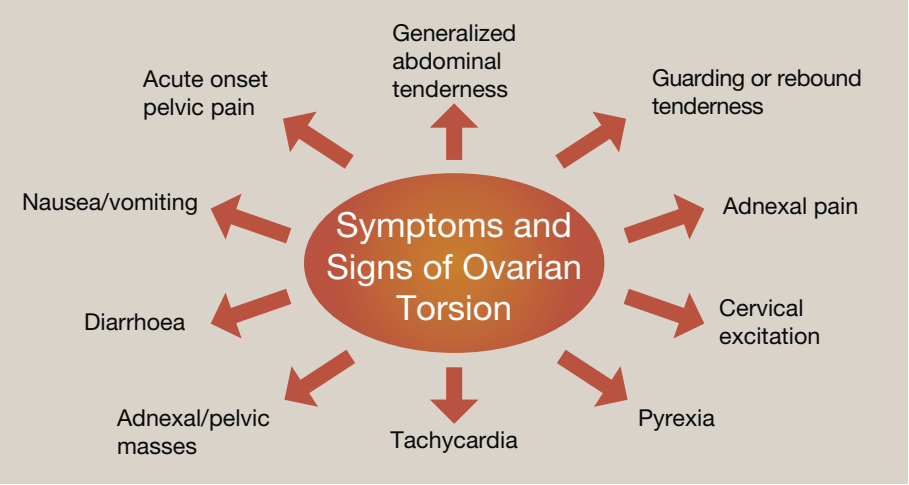

Figure 1

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with potential spread to adjacent organs. Ultrasound scan or CT can assist in diagnosis and exclude important differentials such as appendicitis or diverticular abscess. Patients may present with fever, rigors, pain and vaginal discharge. Spread of infection can result in sepsis and peritonism and indeed be life-threatening if left untreated. Treatment of a pelvic abscess includes laparoscopy or ultrasound-guided drainage and antibiotic therapy. Sometimes interval surgery is required if symptoms persist.

Ovarian masses

Ovarian cysts are common; up to 10% of women will undergo surgery for an ovarian mass in their lifetime. A thorough history should be taken with attention to features which suggest ovarian cyst accident (torsion, rupture or haemorrhage) such as sudden onset of the pain and/or vomiting. Features suggestive of malignancy should also be explored (change in appetite and early satiety, increased urinary frequency or urgency and persistent abdominal distension). Ovarian 'accident' typically presents in the luteal phase of the menstrual cycle.

Abdominal and vaginal examination and assessment of lymphadenopathy presence should be carried out. Transvaginal ultrasound (TVS) is the most effective way to assess an ovarian mass. In the premenopausal woman, simple or functional cysts <50 mm can be managed conservatively and often resolve over two to three menstrual cycles. In postmenopausal women a cyst of any size requires measurement of serum CA125, TVS and calculation of risk of malignancy index (RMI). CT and MRI scans can further assess the cyst. Management depends on multiple different factors (such as the risk of malignancy index, cyst size and symptoms experienced by the patient). Options include conservative management (with repeat TVS at a set interval) or surgery, which may be a cystectomy or salpingo-oophorectomy. Cysts which are concerning and have an increased risk of malignancy warrant CT scan and MDT review to plan potential laparotomy and pelvic clearance.

Chronic causes of pelvic pain

Chronic pelvic pain is constant or intermittent pain experienced for at least 6 months' duration. It is not associated with pregnancy and does not occur exclusively with intercourse or menstruation. Women may present with acute exacerbations of their chronic pain. The aetiology of chronic pain is often multifactorial: it is important therefore to keep an open mind and consider a variety of causes. Adhesions (for example from previous surgery, infection or endometriosis) may be a cause of pelvic pain; however, evidence to support division of adhesions to resolve pain is lacking. Often women with chronic pain will have symptoms suggestive of IBS or interstitial cystitis. Musculoskeletal pain arising from the joints or pelvis or pelvic organ prolapse may be a source of pain and should be considered. Examination of the abdomen and pelvis to ascertain trigger points and vaginal examination may reveal prolapse. Psychological and social issues are important to consider as these commonly occur in association with chronic pain. The multifactorial nature of chronic pain should be explored carefully and a rapport established to optimize the management of this condition. Leiomyomas and endometriosis may also be a cause of chronic pain and are discussed in more detail below.

Uterine fibroids

Fibroids (leiomyomas) are benign tumours of the myometrium and are the most common gynaecological condition. They most commonly occur in women of reproductive age and because their growth is oestrogen-dependent, the majority will decrease in size after menopause. One in four women with fibroids is symptomatic. Fibroids can cause menorrhagia and pain (often associated with menstruation and intercourse). The pain is often of a chronic nature and may have associated pressure effect symptoms (urinary frequency, constipation and lower back pain.) Fibroids can be classified by their anatomical positioning. Those occurring within the muscle wall of the uterus are known as intramural. Subserosal fibroids form on the outside of the uterine wall. Submucosal fibroids develop in the myometrium and grow into the uterine cavity. Subserosal or submucosal fibroids may be attached to the uterus by a narrow stalk of tissue: a pedunculated fibroid. Fibroids can cause acute pain if they undergo degeneration. This occurs if the fibroid outgrows its blood supply and manifests as abdominal pain associated with nausea, vomiting, fever and peritoneal signs. Degeneration can occur more commonly in pregnancy due to the increased demand for blood supply to the uterus. Ultrasound scan will support a clinical diagnosis.

The management of fibroid degeneration tends to be supportive with simple analgesia, as the symptoms are usually self-limiting. Long-term management should be mindful of the patient's desire to preserve fertility. If preservation of fertility is required, definitive treatment by surgical myomectomy (either laparoscopic or open) may be offered.

For patients not wishing to preserve fertility, treatment can be medical (use of GnRH agonists to induce a temporary menopause-like state, insertion of intrauterine device such as a Mirena coil, use of tranexamic acid and oral contraceptives to reduce bleeding). Minimally invasive procedures can be carried out such as uterine artery embolization (embolic agents are injected to cut off the blood supply to the fibroid, resulting in reduction of the fibroid). If the fibroid is contained inside the uterus (submucosal), hysteroscopic resection and/or endometrial ablation can be considered, whereby the lining of the uterus is treated with heat energy to reduce bleeding. Hysterectomy may also be considered as a surgical means of definitive treatment.

Endometriosis

After fibroids, endometriosis is the second most common gynaecological condition, affecting 10% of women of reproductive age. It is a chronic oestrogen-dependent condition caused by growth of endometrial tissue outside the uterine cavity. Therefore, pain is often cyclical and associated with menstruation. Deep dyspareunia can also occur as well as cyclical gastro-intestinal symptoms including dyschezia. Cyclical urinary symptoms such as haematuria and dysuria may occur. 30%–50% of women with endometriosis experience subfertility.

A thorough history is important to establish the nature of the pain and relationship to the menstrual cycle. Examination is often normal; however, adnexal masses may be felt in cases where an endometrioma is present and nodules may be palpable on vaginal examination in cases of deep-infiltrating recto-vaginal endometriosis. The gold standard for diagnosis is laparoscopy, which, while invasive, enables treatment at the same time by

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excision of the deposits and endometriomas, if present. Medical therapies, such as the combined oral contraceptive pill and gonadotrophin-releasing hormone analogues, aim to treat endometriosis by suppressing ovarian function.

In summary, abdominal pain in women is common and the gynaecological differential diagnoses are vast and range from the self-limiting to the life-threatening. A patient-centered approach is essential and input from both gynaecological and surgical specialties may be required to reach a diagnosis swiftly and safely, thereby optimizing patient care. ◆

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Practice points

- Abdominal pain presents a diagnostic challenge for surgeons and gynaecologists alike. A vigilant, combined approach may be required to ensure a swift and optimal clinical outcome for the patient
- In the pregnant patient, ectopic pregnancy must be considered until proven otherwise, as rupture and haemorrhage can be life-threatening
- A severe pain associated with vomiting should be pathopneumonic of ovarian torsion until proven otherwise and requires prompt investigation as management to preserve the ovary is time-critical. Delay can result in decline in reproductive capacity
- Prompt identification and treatment of PID is important to reduce impact on future fertility
- The aetiology of chronic pain is often multifactorial: a variety of causes should be considered. Women may present with acute exacerbations of chronic pain

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